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**Sciencetech Quotation T-030214**

**Date: February 24, 2003**

To :	Attn.:
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Following your request, we are pleased to include a quotation for a  
**Sciencetech SPS-200 Far-Infrared Fourier Transform Interferometer (FTIR)**

Sciencetech's model SPS-200 is specifically designed to operate in the near millimetre and far infrared spectrum. One of the most important features of the SPS-200 is its exclusive mylar polarizer grid beam splitters, which is nearly 100% efficient for all wavelengths up to the cut-off frequency set by the grid separation of 4 $\mu$ m. The SPS-200 also features large 90mm optics for maximum throughput, a high precision stage motor, large roof mirrors, and input/output off-axis paraboloids.



The system includes:

1. Sciencetech SPS-200 far-infrared FTIR
2. Power Supply and Ignitor for internal light source
3. Electronics Controller (for internal choppers and stage stepper motors)
4. SPS-200 Control Software With Host PC Computer
5. Available Water Cooling Recirculator System

6. Available Sample Chamber at Output Port (for small samples)
7. Available Pyro-electric Detector System (with lock-in-amplifier)

## 1. Sciencetech SPS-200 Far-Infrared FTIR

Sciencetech SPS-200 far infrared FTIR spectrometer houses all internal optical components in a vacuum environment. Due to heat dissipation, all electronic components such as the light source power supply, ignitor, electronics controller, host computer and available detector system are external devices for operation in ambient environment.

Internal Optics: Martin Puplett optical configuration  
 Large 4" optics with fast f/2.35 condensers for high light throughput  
 grid polarizer beam splitter for polarizing mode operation (2 $\mu$ m lines with 4 $\mu$ m pitch aluminum on Mylar substrate)  
 Roof mirrors with angle within 3 arc-sec.  
 Off-axis paraboloid condensing optics

Housing: Vacuum tight steel housing capable of maintaining an internal vacuum at 130 millitorr to avoid water vapor absorption and microphonism. Vacuum pump not included. Housing designed to maintain vacuum for several hours without re-pumping.

*Optional non-magnetic aluminum housing version*

Light Source: Internal 150W high pressure Hg-Xe arc lamp (water cooled) with external DC stabilized power supply and ignitor.

*Optional manually operated by-pass flipping mirror* for external light source. This 2.5" x 2.5" flipping mirror allows an external light source, such as a synchrotron, to enter the SPS-200 FTIR housing. The external light source would by-pass the internal 150W Hg-Xe arc lamp.

Modes of Operation: Polarizing or Michelson mode. Each mode has its own computer controlled chopper (input mylar beam splitter chopper for Michelson mode, output grid polarizer chopper for Polarizing mode). Changing modes involve demounting the unused chopper and selecting the correct chopper settings on the external electronics controller.

Spokes of output polarizer are rotated 45 degrees from its reference point, such that when polarization is vertical, the spokes are at 45 degrees to the vertical (*available upon request*).

Controls/Gauges/Ports:	<p>Adjustment knobs for stationary roof mirror (tilt, rotatory shear, lateral shear) to fine tune interference at beam splitter. Such fine adjustments is required to compensate signal loss resulting from temperature change (restore signal at Zero Pass difference position).</p> <p>Vacuum Purge Port</p> <p>Thermocouple vacuum gauge with analog dial display</p> <p>Water Cooling Connections (inlet and outlet ports for water cooling of internal light source and stepper motors)</p>		
Scan Modes:	<p>Step and Scan Mode: In this standard scan mode, detector data collection correlates to the translating roof mirror position. The SPS-200 control software sets the mirror position via RS-232 interface, and collects the detector data via GPIB interface and lock-in amplifier.</p> <p><i>Optional Fast Scan Mode</i> – For fast scan, the roof mirror moves continuously and does not stop at each reference position for detector data collection. An interferogram is generated immediately after the mirror completes its translation (typically 15~60sec). Due to the high data speed, a 16-bit AD board is required to collect the data from the detector into the computer rather than the much slower GPIB interface.</p>		
Spectral Range:	<p>3~500cm<sup>-1</sup> (20μm~3.3mm) in Polarizing Mode</p> <p>3~1000cm<sup>-1</sup> (10μm~3.3mm) in Michelson Mode</p>		
Resolution:	<p>Standard 0.20cm<sup>-1</sup> resolution model with 5cm translation stage</p> <p><i>Optional high resolution 0.025cm<sup>-1</sup> model with 40cm translation stage</i></p>		
Signal/noise ratio:	Michelson mode:	0.4 %	
	MP mode:	2.2 %	
<p><i>Note: Signal is equal to half amplitude at ZPD. Noise is the maximum amplitude at the positive end-switch of the stage (farthest end from beam splitter).</i></p>			
Cooling:	<p>1/4" diameter water cooling loop with an external chilled water supply keeps the internal 150W Hg-Xe arc lamp, choppers, motorized translation stage, and heat sinks cooled in a vacuum environment.</p>		

#### Pricing Options

SPS-200 (standard resolution model with 5cm translation stage, complete SPS-200 software and host computer, Items 2~4 in quotation described)	<b>\$115,333</b>
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below, thermocouple vacuum gauge)

Optional External Source Selector (flipping mirror bypasses internal HgXe)	<b>\$4,830</b>
Optional non-magnetic Aluminum Housing (replaces steel housing)	<b>\$ 7,486</b>
Optional Fast Scan Mode Operation (includes 16-bit AD Board for detector and upgraded SPS-200 control software)	<b>\$ 3,150</b>
Optional High Resolution Mode (replaces 5cm with 40cm translation stage)	<b>\$19,293</b>

## **2. Power Supply and Ignitor for Internal Light Source**

The SPS-200 has an internal 150W high pressure Mercury Xenon (Hg-Xe) light source. It is powered by an external Sciencetech Model 500-200/500-IG variable 200W power supply with ignitor. This current controlled power supply is a highly stabilized low noise linear DC power supply designed for operating Arc Lamps. Due to heat dissipation and EMI noise factor during lamp ignition, this power supply and ignitor is external to the main SPS-200 instrument.

Power: 0~200W, adjustable  
Voltage: 0~30VDC  
Control: Current Control  
Ignitor: Separate Module with 40kV ignition voltage

<b>Model 500-200 Power Supply with Model 500-IG Ignitor</b>	<b>Included in Item 1 above</b>
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## **3. Electronics Controller (for internal choppers and stage stepper motors)**

The SPS-200 FTIR spectrometer has two internal choppers (one for Michelson Mode, one for Polarizing Mode) and one motorized translating roof mirror. These three stepper motor devices are driven by Sciencetech's external MD-500 electronics controller which in turn receives commands from the host PC computer via RS-232 serial interface. Due to heat dissipation of the electronics, this electronics controller is external to the SPS-200 FTIR spectrometer.

<b>Model MD-500 Electronics Controller (drives stepper motors inside SPS-200 interferometer via serial port RS-232 interface)</b>	<b>Included in Item 1 above</b>
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## **4. SPS-200 Control Software With Host PC Computer**

The SPS-200 control software is a Lab-View based application and is now standard with the base SPS-200 model. A Windows executable version is supplied so the user do not require Lab-View development environment to operate it. Although Sciencetech only

supports the Windows version of the SPS-200 control software, a Mac-OS version is also available through a third party vendor.

#### **Main Features:**

- “Step and Integrate” or “Rapid Scan” operation: Rapid Scan operation significantly reduces dead time between data acquisition. By performing more scans in the same time measurement interval, better baseline stability and higher signal to noise ratio can be achieved
- Multitasking: The software is capable of simultaneous scanning and performing data analysis. The SPS200 software runs in its own Window and is undisturbed by other Windows applications running in the background
- Batch Processing: Automated data acquisition can be achieved with simple command scripts. This is useful in organizing unattended automated measurement series
- Modular LabView VI structure: Users may add application specific LabVIEW virtual instruments (VI-s) without recompiling the SPS200 software. This is useful for experiment automation where scanning operation needs to be integrated with external features from the sample changer, light source, temperature controller and magnetic field sweeps, etc.
- Data acquisition and automation log-keeper
- Data stored in ASCII format text files for easy importation into other data analysis software

#### **Data Processing and Spectral Manipulation Functions:**

- Phase Correction by Mertz-Forman method
- Apodizations: Boxcar, Triangular, Bessel, Cosine
- Digital filtering of the Rapid Scan signal
- Add, subtract, normalize, multiply (interferograms or spectra)
- Average and standard deviation (interferograms or spectra)
- Fitting of data by user-specified functions: Functions are analytically specified and new functions are automatically saved on the hard disk for later retrieval

#### **Display:**

- Rapid Scan Mode: display of interferogram, spectrum and the relative sigma of the spectrum
- In Step and Scan Mode: display of interferogram and contents of lock-in amplifier buffer
- Display of spectra, interferograms, ratios, fit results and other data
- Print selected data

#### **Host PC Computer**

A mid-range Intel or AMD based PC with 17” monitor is supplied as the host computer. The SPS-200 Control software will be fully installed and tested. A copy of the software will also be provided on CD for emergency re-installation.

**SPS200 Control Software with Mid-Range Host PC computer  
running Windows 2000 or XP**

**Included in  
Item 1 above**

#### **5. Available Water Cooling Recirculator System**

The SPS-200 FTIR Spectrometer requires water cooling as its vacuum environment does not provide enough heat conductance for its internal light source and motorized mechanical parts. The water inlet and outlet ports of the SPS-200 can simply be connected to a low pressure cold water supply such as a faucet for unlimited chilled water cooling.

However, a recirculating water system is advantageous for long experiments and where there is no nearby access to water. Sciencetech Model 271-REC water recirculator is sufficient to keep the inside FTIR components cooled for vacuum and IR applications. It consists of a radiator, a 4L water storage tank, pump, and matching inlet and outlet hoses for connection to the SPS-200 FTIR spectrometer.

**Sciencetech Model 271-REC Water Cooling Recirculator**

**\$2,980**

#### **6. Available Small Sample Chamber at Output Port**

Sciencetech SPS401 sample chamber can be connected to the output port of the SPS-200 to allow small samples to be studied under both transmission and reflection modes. The sample chamber is totally isolated from the SPS-200 vacuum environment, enabling the user to change samples without upsetting the SPS-200 vacuum housing. The sample chamber can be operated independently in vacuum or atmospheric conditions.

A flange attaches the sample chamber to the output port of the SPS-200 vacuum housing. A polyethylene and polypropylene window between the SPS-200 housing and sample chamber isolates the vacuum environment inside the SPS-200 housing. It also acts as a filter on the light entering the sample chamber.

The optics inside the sample chamber are reflective aspheric optics with gold coating for far-infrared operation. A manual flipping mirror inside the sample chamber allows the user to select between transmission and reflective modes. In transmission mode, an internal mirror focuses the sample onto the detector, whereas in reflection mode, a secondary internal mirror focuses the sample. All optics are pre-aligned and focused at specific detector positions at the sample chamber output port.

An optional peltier cooler is also available to maintain the temperature of the sample holder. For this option, a water cooling loop inside the sample chamber is required. This water cooling loop can be connected to the same water re-circulating system described in Section 5 above. The peltier cooler will maintain the sample holder from -30 ~ +80 °C.

<b>Temperature regulated sample chamber (Model SPS401/T)</b>	<b>\$17,640</b>
<b>Room temperature sample chamber (Model SPS401/R )</b>	<b>\$13,965</b>

## 7. Available Room Temperature Pyro-electric IR detector

Sciencetech's Model IR-Pyro-5-det room temperature pyro-electric IR detector system utilizes a lithium tantalite crystal sensitive in the  $1\mu\text{m} \sim 2\text{mm}$  spectral range. The system includes a detector head with far-infrared window, power supply, lock-in amplifier, and mount for mating to SPS-200 or sample chamber output port.

A Stanford Instrument single phase lock-in amplifier is included to synchronize the detector readings with the internal chopper as a reference signal. The detector signal is then digitized into the host PC computer's SPS-200 software via a GPIB National Instrument PCI card and Stanford Instrument's LabView drivers.

### *Specifications:*

Sensor Material:	lithium tantalite
Sensor Size:	5mm diameter
Responsivity	2000 V/W
Cutoff frequency	100 Hz
Frequency Range:	$1\mu\text{m} \sim 2\text{mm}$
Interface:	GPIB PCI interface card
Software:	LabView Driver integrated to SPS-200 software application

*Price of Detector System below includes alignment, and calibration with FTIR system*

<b>Room Temperature Pyro-electric Detector System:</b>	<b>\$11,026</b>
Model IR-Pyro5-det detector head, IR-Pyro-5-PS power supply, GPIB National Instrument computer interface PCI board, Stanford Instrument Single Phase Lock-in Amplifier, LabView drivers	
<i>* Please note the most expensive component is the Stanford Instrument Lock-in Amplifier.</i>	

## 8. Available On-Site Training and Installation

Sciencetech can provide a two day training and installation session at customer's site to use the SPS-200 spectrometer. This training cost includes setting up the SPS-200 spectrometer, re-calibration after setup, review user operation, and maintenance procedures. Airfare, hotel, and transportation cost for Sciencetech Engineer included.

<b>On-Site Training and Installation</b>	<b>\$ 2,717.00</b>
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## **Delivery Time**

The estimated delivery time for this order is 6 months

Actually delivery time will be confirmed at the time of placing order as our production capacity may change from now until then.

## **Shipping, Handling and Administrative Costs**

Packing <sup>1</sup>	\$750 estimate
Administration Cost for L/C (Letter of Credit) <sup>2</sup>	\$400 (if required)
Administration Cost for Wire Transfer Payments	\$0 (as required)
Shipping <sup>3</sup>	Extra
Custom Brokerage Charges	Not Included
Transportation Insurance <sup>4</sup>	Extra

<sup>1</sup> Our products are carefully packaged in protective Styrofoam wrap and "peanuts" inside a cardboard box. This cost is extra and is typically \$20~\$150. For larger and more sensitive instruments, a wooden crate is used, thereby increasing the packing cost to \$250~\$750.

<sup>2</sup> Banking charges and overhead related to L/C purchases are very high and not recommended for orders less than \$100,000 USD. Sciencetech Inc. only accepts Irrevocable Letter of Credits with expiry dates of 5 months or greater.

<sup>3</sup> Shipping charges are extra and will be quoted at time of delivery for inclusion in final invoice. Sciencetech typically use Emery Worldwide Forwarding or United Parcel Services (UPS) for customer shipments. Alternatively, customers may arrange their own shipping by providing shipping details and billing account number on their Purchase Order.

<sup>4</sup> Sciencetech typically insures all its customer shipments to the value of the invoice. This transportation insurance cost is passed to the customer and included in the invoice. If the customer does not want their shipment insured, they must advise Sciencetech's Customer Support Manager ahead of time.

## **Contact Information**

Please contact us if you have any questions regarding this quotation.

**Douglas Peng**

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## **TERMS AND CONDITIONS**

1. Prices are in U.S. Dollars unless otherwise stated.
2. Original Quoted Prices **DO NOT** include shipping and transportation insurance unless indicated. Prices are based on F.O.B. (Freight on Board) at Sciencetech Inc.'s location in London, ON, Canada. Shipping charges including transportation insurance will be added unless customer arranges pickup from factory.
3. All applicable taxes, duties and brokerage fees are not included. Canada has no export taxes to international destinations, but purchaser may be subject to import duties and associated brokerage fees in their own country. Due to the North American Free Trade Agreement (NAFTA), there is no export or import taxes to the United States or Mexico, but local brokerage fees may apply.
4. Quoted prices valid for 90 Days.
5. A written purchase order (P.O.) is required.
6. 100% prepayment for first-time customers, 35% prepayment for large production orders, and 50% prepayment for all other orders including modular instruments, custom work, and R&D projects. If your institution is unable to make a pre-payment, please contact our customer support manager at [support@sciencetech-inc.com](mailto:support@sciencetech-inc.com). Certain reputable academic, government and selected foreign corporate institutions are exempted from prepayment through the purchase of accounts receivable insurance.
7. Payment is net 30 days. Penalty of 1% per month on overdue payments.
8. Best effort results for all R&D projects.
9. No returns or refunds on most items
10. Delivery time begins when prepayment for order is received

## **WARRANTY**

All Sciencetech Inc (SCI) products have a limited warranty applicable for a period of one year from the time of delivery (lamps and light bulbs are exempted). Any component of a Sciencetech system not directly manufactured by Sciencetech Inc is covered by its own manufacturers warranty ONLY and is not covered by Sciencetech Inc.'s limited warranty.

The Sciencetech Inc limited warranty states that SCI products to which the Sciencetech warranty applies will be free of defects in workmanship and materials under normal use and service. Sciencetech warranty is void if product is improperly maintained, modified, misused or incorrectly installed.

Sciencetech must be notified in writing (fax, e-mail or letter) WITHIN the warranty period of any problem for warranty to be valid. Products under the Sciencetech Inc limited warranty will be replaced or repaired at Sciencetech's option at no additional charge. Any products being returned to Sciencetech for repair or exchange must have shipping, handling and insurance prepaid by customer.

Sciencetech Incorporated is not liable for any consequences resulting from the use of Sciencetech instruments. Under all circumstances maximum responsibility of Sciencetech is limited to the replacement of the instrument or unit. All customer special developments and R&D products are

NOT covered by Sciencetech warranties.

Customers who do not complete payment of their products will have their warranty voided.

The above warranty conditions will prevail unless a specific, independent written agreement has been signed at the time of the Purchase Order.

## **TRADE-IN ALLOWANCE PROGRAM**

If you are using Sciencetech instruments and would like to upgrade all or parts of it, please inquire about our Trade-In credit program

### **THANK YOU FOR YOUR INTEREST IN SCIENCETECH**

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